

REMARKS

The applicant appreciates the Examiner's thorough examination of the application and requests reexamination and reconsideration of the application in view of the preceding amendments and the following remarks.

The Examiner objects to claims 50 and 51 as they depend from a cancelled claim. The applicant has corrected the dependencies of claims 50 and 51 through the above amendments. The applicant has also amended claim 72 to correct a typographical error. The amendment to claims 72 is not made for reasons related to the patentability of the claim.

The applicant's invention, and claim 1 of the subject application in particular, is directed to a rotary seal assembly comprising a first member having a sealing face, a second member having a sealing face with a number of pumping grooves therein, at least a first set of pumping grooves starting proximate a center portion of the sealing face of the second member and extending outward towards the outer diameter of the second member and at least a second set of pumping grooves starting proximate the center portion of the sealing face of the second member and extending inward towards the inner diameter of the second member to direct fluid fed to the center portion of the sealing face simultaneously both inwardly and outwardly from the center portion of the sealing face of the second member to provide a uniform fluid film thickness between the sealing faces of the first and second members when one sealing face cones due to thermal and/or pressure effects, and a feeding groove for providing fluid to the center portion of the sealing face of the second member, the feeding groove being discontinuous forming a number of feeding groove sections.

The Examiner rejects claims 1, 3-4, 6-7, 11-16, 19-20, 22-23, 30, 32-33, 37-38, 41-43, 45-46 and 48 under 35 U.S.C. §103(a) as being unpatentable over German Patent No.

3,819,566 in view of U.S. Patent No. 3727,924 to *Henderson*. The Examiner states that the '566 patent discloses a seal assembly comprising a stator and rotor, each having a sealing face and two sets of pumping grooves and a feeding groove, but fails to disclose that the feeding groove is discontinuous. The Examiner further states that *Henderson* teaches a sealing assembly using plural feeding grooves to ensure a uniform fluid film across the sealing faces, and that it would have been obvious for one of ordinary skill in the art to modify the feeding groove of DE '566 by making it discontinuous as taught by *Henderson*.

However, the applicant submits that it would not have been obvious to modify the '566 patent to include the discontinuous feeding groove of *Henderson*. The '566 patent discloses a gap seal that feeds barrier gas at the ring center to stop fluid exchanging across seal faces. The annular groove in the ring center, stored with higher-pressure barrier gas, acts as a static seal as well when not rotating. See the last paragraph of page 3 of the translation of the '566 patent.

The '566 patent specifically states that “[t]he barrier effect is ensured by the gas supply into the concentric flat annular groove arranged in the ring center.” (emphasis added). Modifying the feeding groove of the '566 patent by making it discontinuous goes against the teachings of the '566 patent as the '566 patent states that an annular groove is required to ensure the barrier effect and to operate as a static seal. Accordingly, the '566 patent teaches away from the use of a discontinuous feeding groove as claimed by the applicant.

There is no motivation, teaching or suggestion to modify the feeding groove of the '566 patent to be discontinuous as the '566 feeding groove is specifically disclosed to act as a static seal when not rotating. Further, the '566 patent makes no disclosure, teaching or suggestion to use the annular groove to achieve a uniform fluid film if a seal member experiences coning.

Therefore, it would not have been obvious to one of ordinary skill in the art to modify the '566 patent to include a discontinuous feeding groove as taught by *Henderson*. Therefore, the claims are patentable over the cited references.

The Examiner also rejects claims 1, 3-4, 6, 11-25 and 37-51 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,213,473 to *Lebeck* in view of *Henderson*, and claims 26, 28, 29, 52 and 54 under 35 U.S.C. §103(a) as being unpatentable over *Lebeck* in view of *Henderson* and further in view of U.S. Patent No. 3,751,045 to *Lindeboom*. The Examiner states that *Lebeck* discloses a seal assembly comprising a stator and rotor, each having a sealing face and two sets of pumping grooves and a feeding groove, but fails to disclose that the feeding groove is discontinuous. The Examiner further states that *Henderson* teaches a sealing assembly using plural feeding grooves to ensure a uniform fluid film across the sealing faces, and that it would have been obvious for one of ordinary skill in the art to modify the feeding groove of *Lebeck* by making it discontinuous as taught by *Henderson*.

The applicant submits that it would not have been obvious to modify *Lebeck* to include the discontinuous feeding groove of *Henderson*. *Lebeck* states that pressurized gas is continually provided to the annular groove 68, and the gas pressure is maintained at a pressure higher than the anticipated process fluid pressure within the pump housing 8. However, the discontinuous feeding groove of the present invention serves to localize the supply of source fluid so that additional local film stiffness can be generated if the coning and waviness varies circumferentially. *Lebeck* only discloses maintaining the gas pressure in the annular groove and does not disclose, teach or suggest generating additional local film stiffness. Accordingly, there is no motivation, teaching or suggestion in *Lebeck* to modify the annular groove of *Lebeck* by making it discontinuous as taught by *Henderson*.

Accordingly, it would not have been obvious to one of ordinary skill in the art to

include discontinuous feeding grooves in *Lebeck* as taught by *Henderson*. Therefore, the claims are patentable over the cited references.

The Examiner rejects claims 30 and 55-57, 60-61 and 64-75 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,609,342 to *Peterson* in view of *Lebeck* in view of *Henderson*, and claims 76 and 78 over *Peterson* in view of *Lebeck* in view of *Henderson*, and further in view of *Lindeboom*.

The Examiner states that *Peterson* discloses a rotary face seal assembly comprising a stator having a sealing face and a rotor having a sealing face, and that the stator or rotor can have pumping grooves in the sealing face. The Examiner further states that *Peterson* does not disclose that the grooves are partitioned into first and second sections or that the rotor or stator have a feeding groove and orifice, and that *Lebeck* teaches a rotary face seal assembly wherein the sealing faces of the rotor or stator comprise plural pumping grooves having a first section and second section and a feeding groove having plural feeding orifices.

The Examiner further states that *Lebeck* does not disclose that the feeding groove is discontinuous forming a number of feeding groove sections and that *Henderson* teaches that the feeding groove can be a continuous annular groove or a plurality of arcuate grooves (i.e., discontinuous). The Examiner alleges that it would have been obvious for one of ordinary skill in the art at the time the invention was made to make the feeding groove of *Lebeck* discontinuous as such is an art equivalent as taught by *Henderson*.

However, as stated above, it would not be obvious to one of ordinary skill in the art to include discontinuous feeding grooves in *Lebeck* as taught by *Henderson*. Therefore, there is no motivation, teaching or suggestion to modify *Peterson* to include the features of *Lebeck* as modified by *Henderson*.

Accordingly, it would not have been obvious to one of ordinary skill in the art at the

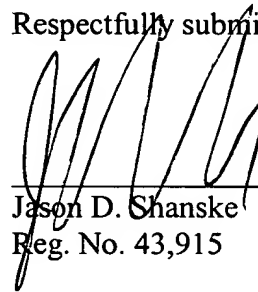
time the invention was made to modify *Peterson* to include a discontinuous feeding groove as claimed by the applicant. Therefore, the claims are patentable over the references.

CONCLUSION

Each of the Examiner's rejections has been addressed or traversed. Accordingly, it is respectfully submitted that the application is in condition for allowance. Early and favorable action is respectfully requested.

If for any reason this Response is found to be incomplete, or if at any time it appears that a telephone conference with counsel would help advance prosecution, please telephone the undersigned or his associates, collect in Waltham, Massachusetts, at (781) 890-5678.

Respectfully submitted,



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